

The background image is a photograph of a beach. In the foreground, there is a large, textured pile of bright green algae or seaweed on the sand. Beyond the algae, the water is dark and calm. In the distance, there are white-capped waves breaking on the shore under a clear blue sky.

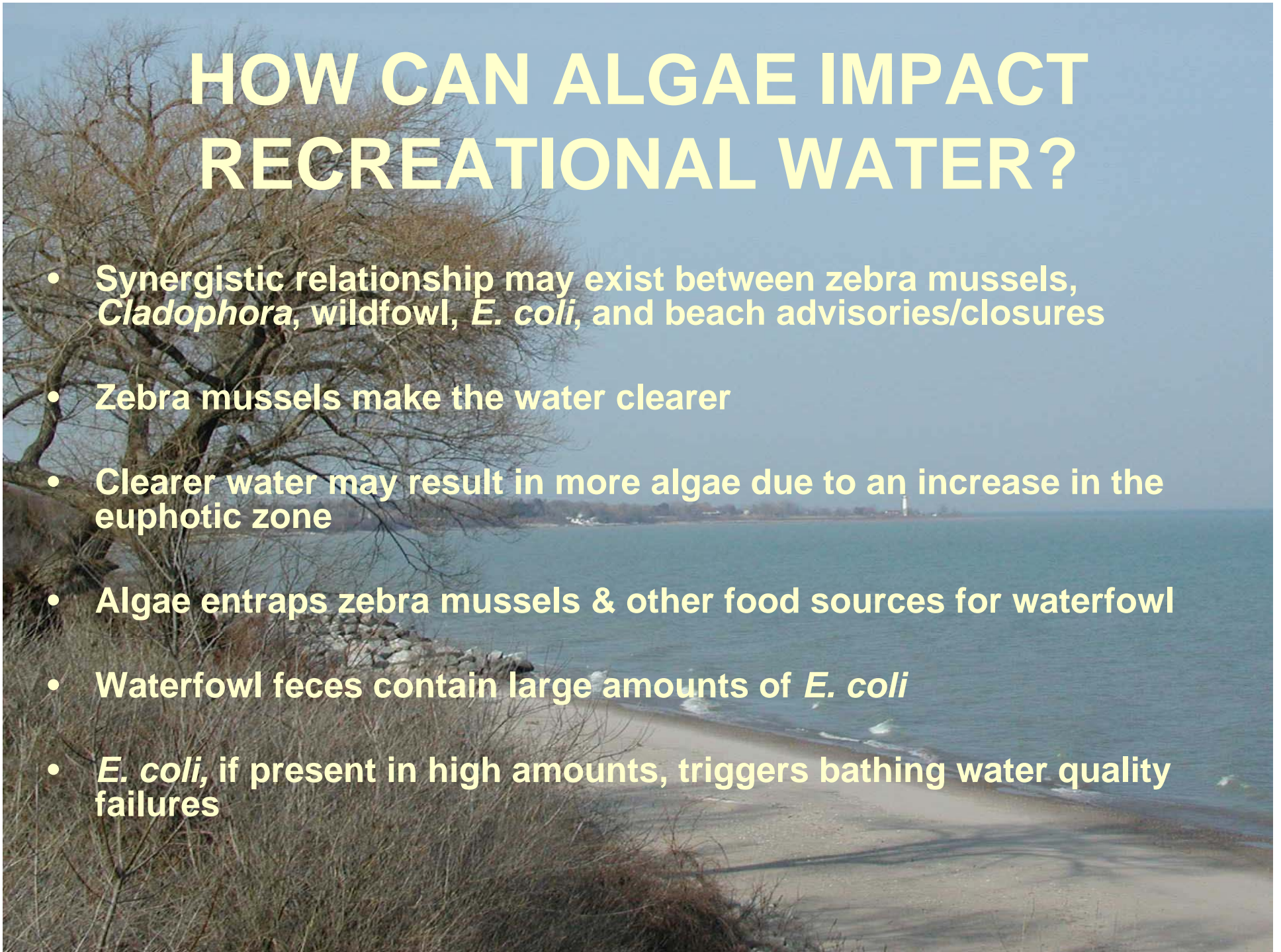
# **Improving Beach Management to Reduce the Impacts of *E. coli***

**Nuisance Algae on Lake Michigan Shores - Public Forum  
February 18, 2004**

**Julie Kinzelman  
City of Racine**

# HOW CAN ALGAE IMPACT RECREATIONAL WATER?

- Synergistic relationship may exist between zebra mussels, *Cladophora*, wildfowl, *E. coli*, and beach advisories/closures
- Zebra mussels make the water clearer
- Clearer water may result in more algae due to an increase in the euphotic zone
- Algae entraps zebra mussels & other food sources for waterfowl
- Waterfowl feces contain large amounts of *E. coli*
- *E. coli*, if present in high amounts, triggers bathing water quality failures



A photograph of a sandy beach covered with numerous zebra mussels and several white feathers. The mussels are small, dark, and have characteristic white diagonal stripes. The feathers are white and appear to be from waterfowl. The text 'ZEBRA MUSSELS' is overlaid in large, bright green, bold capital letters in the upper center of the image.

# ZEBRA MUSSELS

The introduction of zebra mussels into the Great Lakes has had an impact on their ecology.



# ALGAE BLOOM – RACINE, WI

*CLEARER WATER  
EQUALS  
MORE PHOTOSYNTHESIS*



**Drifts of *Cladophora* Attract  
Nuisance Wildfowl**

**Decomposing Algae that is  
Contaminated with Feces is a  
Good Growth Medium for  
Bacteria**

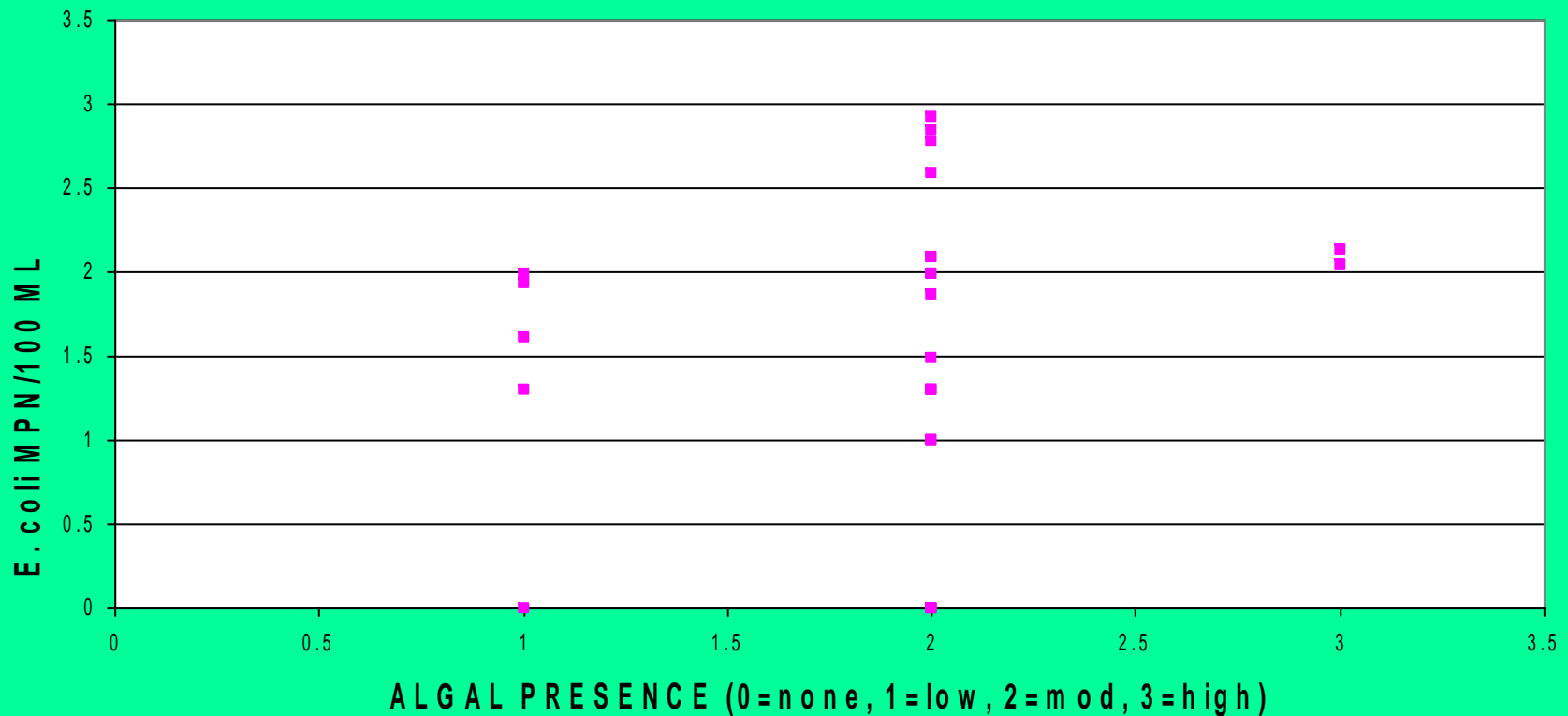




**Elevated Levels of *E. coli* Trigger  
Beach Advisories**

# Algae vs. Surface Water Quality

ALGAL PRESENCE VS. E. COLI CONCENTRATION



# MANAGEMENT APPROACHES

- Realize that non-human, non-sewage contamination has potential to impact human health
- Realize that sources of contamination are inter-related when developing a plan
- Use research data, when available, to assist in the development of BMP
- Must work within budget

# MANAGEMENT PRACTICES

- Enact public ordinances prohibiting the feeding of wildfowl at the beach
- Mechanical removal of large algae drifts from near shore waters
- Alterations in grooming techniques to reduce *E. coli* in beach sands

# Enact Public Ordinances



- **Eliminate external sources of food for wildfowl**
- **Locate signs at entrance points to beach area and in the vicinity of any concession areas**

# GULL FECES CONTAINS POTENTIAL HUMAN PATHOGENS

- 313 FRESH GULL FECAL SAMPLES
- *SALMONELLA* SPP (1.6%)
- *CAMPYLOBACTER* SPP (14.4%)
- *PLESIOMONAS SHIGELLOIDES* (7.0%)
- POTENTIAL RISK???

# **SURF RAKE® MECHANICAL BEACH GROOMER**



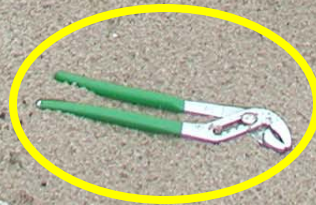




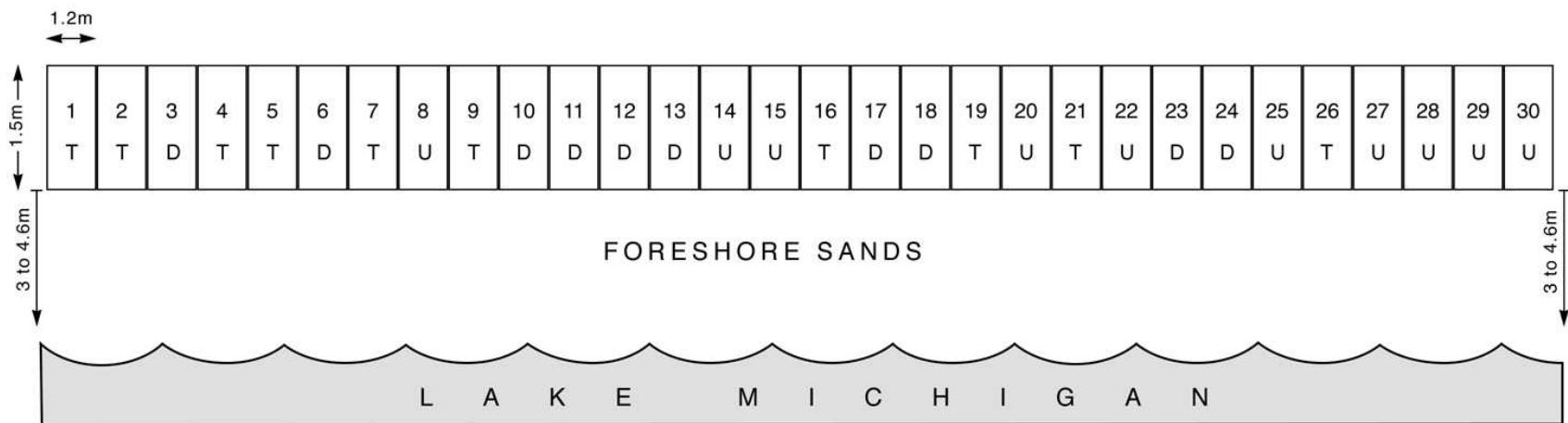
# REMOVAL OF *CLADOHORA* FROM NEAR SHORE WATER



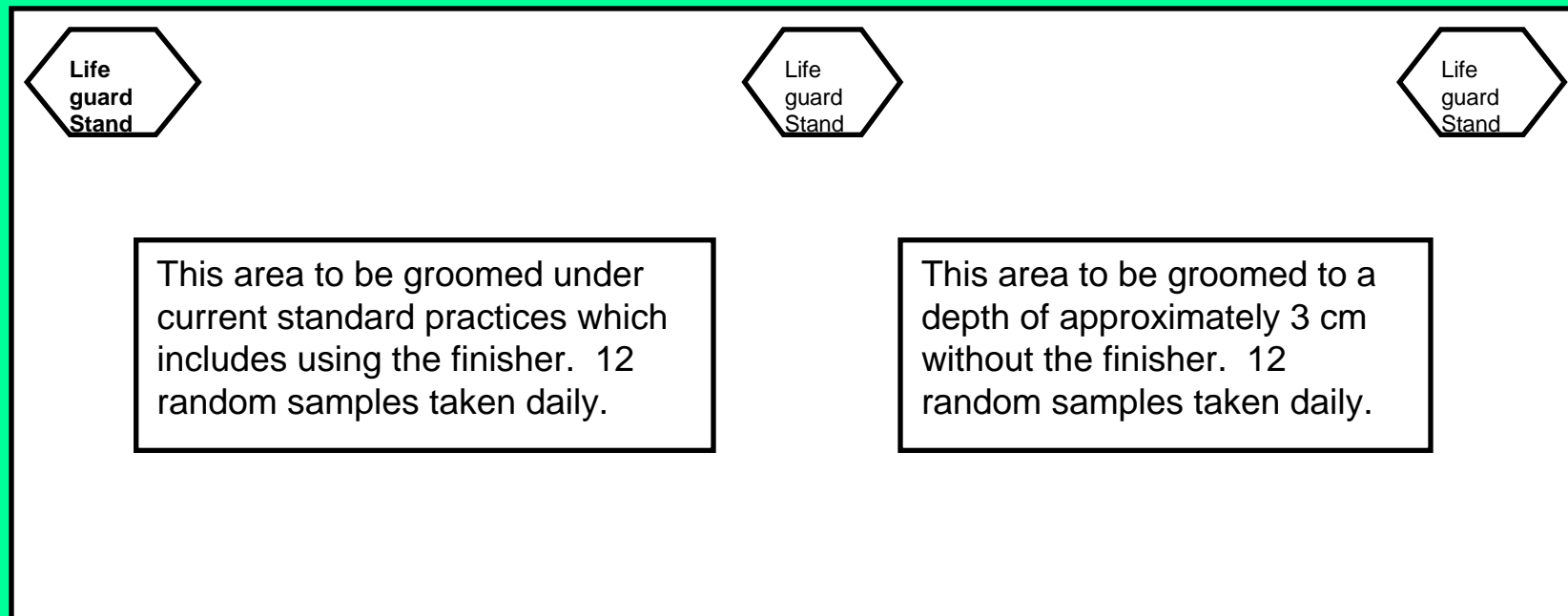
# CONTENTS OF THE HOPPER FROM THE BEACH GROOMER



# BEACH GROOMING STUDY-2001



# BEACH GROOMING STUDY-2002



# GROOMING STUDIES 2001 & 2002



# ***Cladophora* on groomed & compacted sands**



# DEEP W/O COMPACTING VS. UNGROOMED



# **COSTS ASSOCIATED WITH GROOMING STUDIES & IMPLEMENTATION**



- **2001 STUDY FUNDED BY A DNR GRANT**
- **2002 STUDY FUNDED BY A ROOT-PIKE WIN GRANT**
- **NO COST TO IMPLEMENT - USED EXISTING EQUIPMENT AND PERSONNEL**
- **NO CITY DOLLARS EXPENDED**

# IMPROVING BEACH MANAGEMENT PRACTICES IS A KEY COMPONENT TO IMPROVING WATER QUALITY



# ACKNOWLEDGEMENTS

- RACINE HEALTH DEPARTMENT
- CITY OF RACINE DEPARTMENT OF PARKS, RECREATION, AND CULTURAL SERVICES
- WI DNR
- ROOT-PIKE WIN
- UWM WATER INSTITUTE
- *In memory of Tom Hansen †*